

SpaceLogic PIBCV with SP90 Actuator

Pressure Independent Balancing and Control Valve Assemblies for Energy Valve Control Solutions

Product Description

The **SpaceLogic** PIBCVs and SP90 Actuators provide an unparalleled performance and functionality in hydronic heating and cooling applications. The VP228E and VP229E PIBCVs offer automatic balancing and flow control, while the SP90 Actuator provides both flow and energy usage data or control from high positional accuracy and field bus communication. This unique functionality enables improved comfort and energy savings during operation, as well as optimizing the installation, balancing and commissioning costs during construction.

Automatic balancing within PIBCV valves provide stable flow regulation regardless of pressure fluctuations in the system. The control valve portion of the PIBCV that the SP90 drives, precisely regulates the water/glycol flow from close-off up to the maximum flow.

Features of PIBCV with SP90

- **Reduced Energy Consumption**
Pressure independence in the valve inherently ensures no overflow of water/glycol through the coil. Limiting the water/glycol flow to the design load of the coil has a significant effect on energy efficiency and ensures high flow and return temperatures (ΔT).
- The SP90 is further able to monitor these flow and return temperatures via separate temperature sensors, this allows the true performance of the heat exchanger to be observed. Further, the SP90 is also able to control on ΔT , and restricting flow to ensure a minimum ΔT is never exceeded.
- **Energy Monitoring and Control**
The SP90 uses the known flow data from the PIBCV along with temperature sensors to calculate power and energy consumption. This provides the heat map of hydronic energy to be communicated up to the BMS for further monitoring and optimisation.



- **Improved Comfort**
The SpaceLogic PIBCV valves are not affected by other valves in the system that may be opening and closing throughout the day or other piping system disturbances providing more constant, comfortable, room temperatures. The control of very low flows ensures modulating control even on low partial load duties, tightening the temperature control band in the room.
- **Reduced Pumping Costs**
A reduction in overflows through the network reduces pumping costs. A smaller pump head and equipment is required compared to traditional configurations. Further, through the SP90, all the flow rates can be monitored and adjusted remotely.
- **Reduced Installation and Costs**
The PIBCV allows just one valve to be installed rather than two or three since the SpaceLogic PIBCV functions as an automatic pressure balancing valve, flow limitation valve and a control valve. With the SP90, there is no need to physically adjust the maximum flow rate either as this all made remotely via the BMS.
- **Easy and Quick Commissioning**
SpaceLogic SP90 and PIBCV setup time is significantly reduced compared with traditional pressure dependant valves and pressure independent solutions using 0...10V actuators. Commissioning widgets and the use of Schneider Electric's Automated Engineering Tools (AET), help ensure configuration and set up time is saved and simplified.
- **Improved Reliability**
A stable flow control reduces or removes hunting, this significantly extends the life of the mechanical equipment. The SP90 analytics communicate Change of Value (CoV) warnings and alarms on operational status.

Product Selection

The PIBCV and SP90 actuators can be provided as an assembly or as individual products for field assembly.

The assembly models also include tail pieces providing an internal NPT thread on the valve. No cables are provided with valve assemblies, the appropriate cable will need to be ordered separately.

Key selection criteria:

1. Determine Test Plug Requirement

Test plugs enable the ability to verify if the pressure into the PIBCV is sufficient and correct for accurate operation. It is recommended to use valves with test plugs on the index/critical point, upstream of this point, valves with test plugs may not be needed.

2. Select on design flow rate

Choose the smallest valve that can exceed the needed flow rate. Note the higher minimum operating pressure that is needed for the high flow models (the models without test

plugs). Avoid using the high flow models close to the index/critical valve.

Note: The exact flow rate on the valve is set by the actuator from the BMS, no mechanical adjustment of the valve is needed

Example 1: Needed design flow of 1.8 GPM

The closest valve that can exceed this flow is the ½" 2.0 GPM size, although larger capacities will work still work, they will not have the same granularity of control.

Example 2: Needed design flow of 3 GPM:

The valves that can exceed this flow are either the ½" 5.0 GPM model: this does not have test ports and needs a minimum of 5 psi to operate, or the ¾" 4.0 GPM model which does have a test plug version and requires just 2.32 psi to operate.

Field assembly allows the additional choice of External NPT and Sweat tail pieces: these types perform as a union and allow easy orientation of the product, as well as easy disconnection. In Table 3, each tail piece part number includes two tail piece sets.

Valve and Valve Actuator Assembly Selection

Table 1. Part Number Ordering

Valve Size	Nominal Valve Flow (GPM)	ΔP_{min} (psi)	Without Test Plugs		With Test Plugs	
						
			Individual Valve Part No.	Assembly Part No. (with NPT internal thread)	Individual Valve Part No.	Assembly Part No. (with NPT internal thread)
½" (DN10)	0.66	2.32	VP228E-10BQLNT	VP228E-10LN-L05-B101	VP228E-10BQL	VP228E-10L-L05-B101
½" (DN15)	1.2	2.32	VP228E-15BQLNT	VP228E-15LN-L10-B101	VP228E-15BQL	VP228E-15L-L10-B101
½" (DN15)	2	2.32	VP228E-15BQSNT	VP228E-15SN-L20-B101	VP228E-15BQS	VP229E-15S-L20-B101
½" (DN15)	5	5	VP229E-15BQHNT	VP229E-15HN-L50-B101		
¾"	4	2.32	VP228E-20BQSNT	VP228E-20SN-L40-B101	VP228E-20BQS	VP228E-20S-L40-B101
¾"	7.5	5	VP229E-20BQHNT	VP229E-20HN-L75-B101		
1"	7.5	2.9	VP229E-25BQSNT	VP229E-25SN-L75-B101	VP229E-25BQS	VP229E-25S-L75-B101
1"	12	5	VP229E-25BQHNT	VP229E-25HN-012-B101		
1¼"	14.1	2.9	VP229E-32BQSNT	VP229E-32SN-014-B101	VP229E-32BQS	VP229E-32S-014-B101
1¼"	17.5	5	VP229E-32BQHNT	VP229E-32HN-017-B101		

End connections not shown in images

Table 2. Selection: Valve Actuator Codes

Actuator Part Number	Actuator Code	Valve Sizes	Non-Spring Return
SP90-24BMM	B101	½"...1¼"	√

Table 3. Selection: ½" ... 1¼" End Connections

	Part Number	Pipe Size	Approximate Length, inches (mm)	Approximate Nut Size, inches (mm)	Approximate Valve Body, Thread Engagement inches (mm)	Comments	Image
Replacement Internal End connections	9112108010	1/2"	1.1 (28)	0.99 (25)	0.29 (7.2)	For VP228E-10BQLNT and VP228E-10BQL 1/2" valve bodies only	
	9112108015	1/2"	1.1 (28)	1.19 (30.2)	0.29 (7.2)	For all 1/2" valve bodies except VP228E-10BQLNT and VP228E-10BQL	
	9112108020	3/4"	1.26 (32)	1.46 (37)	0.33 (8.4)	For all 3/4" valve bodies	
	9112108025	1"	1.5 (38)	1.81 (45.8)	0.41 (10.4)	For all 1" valve bodies	
	9112108032	1¼"	1.65 (42)	2.05 (52.1)	0.42 (10.7)	For all 1-1/4" valve bodies	
External NPT Two External NPT Connectors, Two Nuts, Two Gaskets *	9112110010	3/8"	1.24 (31.5)	0.99 (25)	0.29 (7.2)	For VP228E-10BQLNT and VP228E-10BQL 1/2" valve bodies only	
	9112110015	1/2"	1.32 (33.5)	1.19 (30.2)	0.29 (7.2)	For all 1/2" valve bodies except VP228E-10BQLNT and VP228E-10BQL	
	9112110020	3/4"	1.5 (38)	1.46 (37)	0.33 (8.4)	For all 3/4" valve bodies	
	9112110025	1"	1.73 (44)	1.81 (45.8)	0.41 (10.4)	For all 1" valve bodies	
	9112110032	1¼"	1.85 (47)	2.05 (52.1)	0.42 (10.7)	For all 1-1/4" valve bodies	
Internal Sweat Two Internal Sweat Ends, Two Nuts, Two Gaskets *	9112109010	3/8" Tubing (with 1/2" OD)	1.06 (27)	0.99 (25)	0.29 (7.2)	For VP228E-10BQLNT and VP228E-10BQL 1/2" valve bodies only	
	9112109015	1/2" Tubing (with 5/8" OD)	1.32 (33.5)	1.19 (30.2)	0.29 (7.2)	For all 1/2" valve bodies except VP228E-10BQLNT and VP228E-10BQL	
	9112109020	3/4" Tubing (with 7/8" OD)	1.5 (38)	1.46 (37)	0.33 (8.4)	For all 3/4" valve bodies	
	9112109025	1" Tubing (with 1-1/8" OD)	1.73 (44)	1.81 (45.8)	0.41 (10.4)	For all 1" valve bodies	
	9112109032	1¼" Tubing (with 1-3/8" OD)	1.85 (47)	2.05 (52.1)	0.42 (10.7)	For all 1-1/4" valve bodies	

* PIBCV Tail pieces with an internal thread are of a one piece design.

PIBCV tail pieces in sweat or external taper thread are of a separable union design. This design improves the mounting, dismounting and the ease of fixing the orientation assembly.

To select the sweat or external thread tail connectors, first select the individual valve according to the flow rate, then the appropriately sized tail piece according to the valve size, adding into the selection the SP90 actuator and the needed electrical cables.

Table 4. Available Cables*

Type	Length (m)	Connections	Cable (Plenum Rated)
Digital	1.5	bus & power	9114401500P
	10.0		9114410000P
Daisy chain	0.5	Actuator to actuator	9114500500P
	1.5		9114501500P
	5		9114505000P
	10.0		9114510000P
Analogue + I/O	1.5	Multi-core free wire cable	9114601500P
Energy		PT1000 surface mount temp sensors	9114701500P
		PT1000 insertion probe temp sensors	9114801500P

* Cables not included with actuator and must be ordered separately.

Technical Data

Table 5. Specification PIBCV valves, ½...1¼"

Valve Size			½"				¾"		1"		1¼"	
Valve Assembly Part Number without PT Ports ¹⁾			VP228E -10LN-	VP228E -15LN-	VP228E -15SN-	VP229E -15HN-	VP228E -20SN-	VP229E -20HN-	VP229E -25SN-	VP229E -25HN-	VP229E -32SN-	VP229E -32HN-
Valve Assembly Part Number with PT Ports ¹⁾			VP228E -10L-	VP228E -15L-	VP228E -15S-	-	VP228E -20S-	-	VP229E -25S-	-	VP229E-32S-	-
Flow range	Q _{min}	gal/min	.13	.24	.4	1	.8	1.5	1.5	2.4	2.82	3.5
	Q _{nom} (100%) ²⁾		.66	1.2	2	5	4	7.5	7.5	12	14.1	17.5
	Q _{high}		.79	1.45	2.4	5.5	4.75	8.25	8.2	13.2	15.5	19.25
Setting range ³⁾		%	20-120%			20-110%	20-120%	20-110%				
Diff. pressure ^{4), 5)}	ΔpQ _{nom} (ΔpQ _{high})	psi	2.32-58 (2.61-58)			5-58 (5.8-58)	2.32-58 (2.61-58)	5-58 (5.8-58)	2.9-58 (3.63-58)	5-58 (5.8-58)	2.9-58 (3.63-58)	5-58 (5.8-58)
Stroke Q _{nom}		in. (mm)	0.09 (2.25)			.157 (4)	0.09 (2.25)	.157 (4)	.177 (4.5)			
Connection		ext. thread (ISO 228/1)	G ½ A	G ¾ A			G 1 A		G 1¼ A		G 1½ A	
Body Pressure Rating		psi	EN 12516-2:2004, 250 psi, PN 16									
Leakage acc. to standard IEC 60534			Class 4, max. 0.01% of Q _{nom}						max. 0.05% of Q _{nom}			
Max. close off differential pressure across the valve			232 psi (16 bar)									
Control range			Acc. to standard IEC 60534 control range is high as flow characteristic is linear (1:1000)									
Control valve's characteristic			Stem up open, Linear (can be converted by actuator to equal percentage)									
For shut off function			Acc. to ISO 5208 class A - no visible leakage									
Flow medium			Water and water mixture for closed heating and cooling systems according to plant type I for DIN EN 14868. When used in plant Type II for DIN EN 14868 appropriate protective measures are taken. The requirements of VDI 2035, part 1 + 2 are observed.									
Medium temperature		°F (°C)	(water/glycol) 15...250 (−10 ... +120)									
Materials in the water/glycol												
Valve bodies			Dezincification Resistant Brass (CuZn36Pb2As - CW 602N) per EN 12420									
Cone (Pc)			Stainless Steel, W.Nr. 1.4305									
Seat (Pc)			EPDM									
Seat (Cv)			Dezincification Resistant Brass (CuZn36Pb2As - CW 602N)									
Membranes and O-rings			EPDM									
Springs			Stainless Steel, W.Nr. 1.4568, W.Nr. 1.4310									
Cone (Cv)			Wrought copper, CuZn40Pb3 - CW 614N									
Screw			Stainless Steel (A2)									
Flat gasket			NBR									
Sealing agent (only for valves with PT Ports)			Dimethacrylate Ester									
Materials out of the water/glycol												
Plastic parts			PA									
Insert parts and outer screws			CuZn39Pd3 - CW614N									

Note: Water/glycol Compatibility: It is the responsibility of the installer or product specifier to verify water/glycol compatibility of the valves construction materials with the supplier of water/glycol treatment/heat transfer solution.

1) See Tables 1 and 2 for valve assemblies part number.

2) Factory setting of the valve is done at Q_{nom} (100%)

3) Regardless of the setting, the complete valve can modulate below 1% of set flow.

4) Δp = (P1-P3) min-max

5) 87 psi Δp is possible if consideration has been made to the flow velocity, cavitation and noise. For application usage please speak with Product Support

Pc - Pressure controller

Cv - Control valve

Table 6. Specifications

Actuator Part Number	SP90-24BMM
Actuator code (designation of Part number assembly)	B101
Power supply range	24 V ac/dc, ± 25%, 50 / 60 Hz
Power consumption	Operating: 2.7 VA @ 24 Vac / 1.2 W @ 24 Vdc Standby: 1.8 VA @ 24 Vac / 0.7 W @ 24 Vdc
Protection class	III safety extra-low voltage
Electrical connection	Pre-molded plug connector
Control signal Digital	BACnet MS/TP, Modbus RTU
	0-10 VDC, 0-5 VDC, 2-10 VDC, 5-10 VDC, 2-6 VDC, 6-10 VDC, 0-20 mA, 4-20 mA
Impedance	Rin AI:0 >100 kΩ (V); 500 Ω (mA) Rout AO: 1500 Ω
Actuator speed selections (open to close) sec/mm	3, 6, 12, 24, Constant Time
Max. Stroke	7 mm (0.28")
Force	90 N
Positional accuracy	± 0.005 mm
Accuracy, Calculated Energy Usage	+/- 15%
Working Ambient temp. range	-10°...50 °C
Ambient humidity	98% r.h., non-condensing (according to EN 60730-1)
Max. medium temp.	120 °C (248 °F)
Storage temp. range	-40...70 °C (14...158 °F)
Grade of enclosure	IP54 (IP40 upside-down)
Weight	0.4 kg (0.88 lb)
Approvals	EMC Directive 2004/108/EC, EN 60730-2-14:1997, EN 60730-2-14/A1:2001, EN60730-1:2011 RoHS Directive 2016/863/EU
Application Software version	4.21...4.29
Firmware Version	2.10

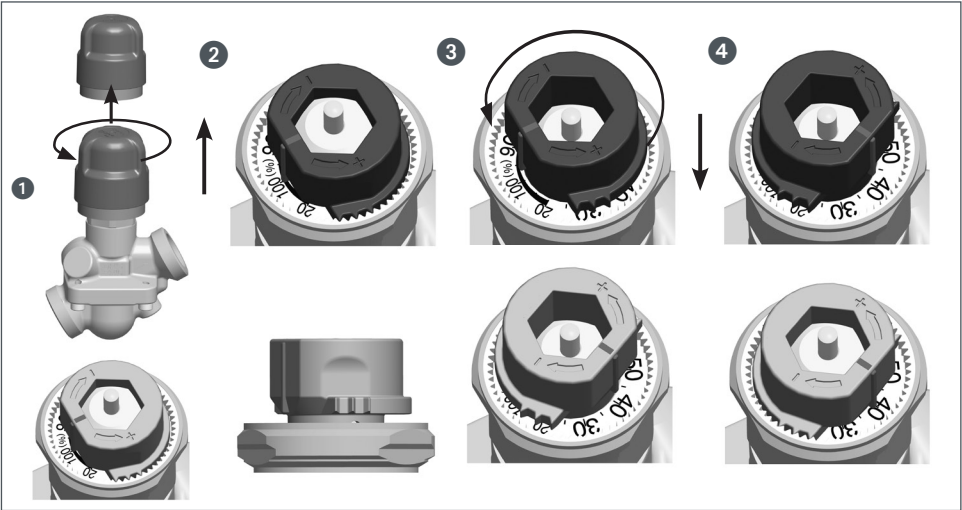
PIBCV Flow Setting

½...1¼" Size Valves

Every VP228E/VP229E PIBCV is shipped with the flow preset for 100%. This default configuration is the recommended setting for most applications with the SP90. In some circumstances, especially if flushing is to be performed where the flow may be adjusted above Q_{nom}, follow the four steps below:

- 1 Remove the black protective cover or the mounted actuator.
- 2 Raise the green pointer.
- 3 Turn (anti-clockwise to increase) to the new presetting.
- 4 Press the pointer back into the lock position. After the pointer is clicked back into place the presetting is locked.

The presetting scale indicates values from 100% flow to 20%. Clock wise turning would decrease the flow value while counter clock wise would increase it. The Valves should not be mechanically set below the 100% flow setting when paired with the SP90 actuator.



Dimensions

Threaded Valves ½ to 1¼" (inches)

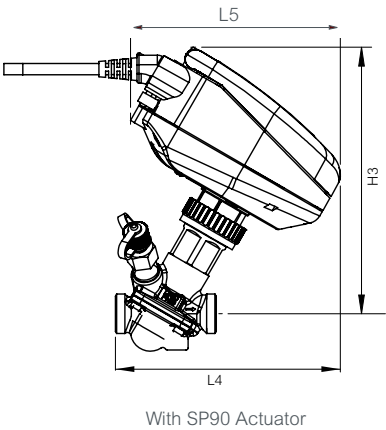
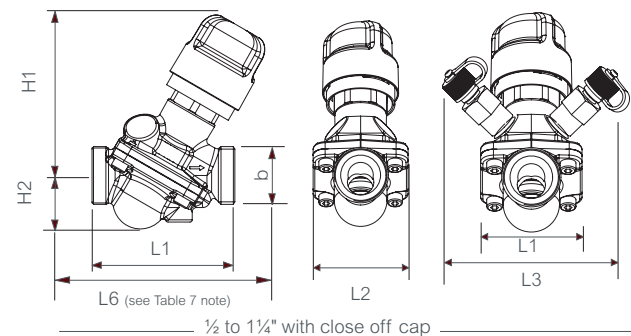


Table 7. Threaded Valves ½ to 1¼" (inches)

Type	L1	L2	L3 (PLUGS)	L4	L5	H1	H2	H3	b ISO 228/1	Valve Body Weight (lb.)
				SP90	SP90			SP90		
1/2" VP228E- 10Lx	2	1.41	3.11	4.65	4.33	2.9	.78	5.6	G ½	.83
1/2"	2.5	1.7		4.92		3	1	5.7	G ¾	1
3/4"	3.2	2.2		5.24		3	1.2	5.8	G 1	1.43
1"	4	2.7		5.83		3.5	1.5	6.14	G 1 ¼	3.2
1¼"	5.1	3.5		6.54		3.9	2.3	6.58	G 1 ½	4.8

NOTE: Valve Body Tail Piece Dimensions in Table 3.
L6 = L1 + 2x (Length - thread engagement)

Supporting Documentation

- Specification Sheet
- F-27974
- Installation Instructions
- F-27960
- Product Manual
- F-27972